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TEMPERATURE CONTROL SPOILER

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Claim

A type of temperature control spoiler characterized by the following facts:

temperature control spoiler (7) is arranged between media (1) of a magnetic disk device, which has magnetic disk media (1) holding recorded information and a magnetic head for recording/reproduction of information on/from said media (1) accommodated in a sealed structure (DE);

said temperature control spoiler (7) has shapes with different windages depending on the temperature distribution between media (1) so as to reduce the temperature differences between said media (1).

Detailed explanation of the invention

Summary

This invention pertains to a type of temperature control spoiler for reducing the thermal mistracking of a magnetic disk device.

The purpose of this invention is to provide a type of temperature control spoiler that can actively correct the temperature differences between media and reduce the thermal mistracking that results from the temperature differences between media.

This invention provides a type of temperature control spoiler characterized by the following facts: the temperature control spoiler is arranged between media of a magnetic disk device, which has magnetic disk media holding recorded information and a magnetic head for recording/reproduction of information on/from said media accommodated in a sealed structure; said temperature control spoiler has shapes with different windages depending on the temperature distribution between media so as to reduce the temperature differences between said media.

Industrial application field

This invention pertains to a type of temperature control spoiler for reducing thermal mistracking of a magnetic disk device.

In recent years, with the increase in capacity of magnetic disk devices, thermal mistracking has become a more and more important problem.

There are several factors involved in thermal mistracking. Among these, temperature differences between media are important. Consequently, it is necessary to ensure a uniform temperature distribution among the media.

Prior art

Figure 3 is a schematic diagram illustrating a conventional magnetic disk device. As shown in the figure, plural magnetic disk media (to be referred to as disks hereafter) (1) are held on spindle (2) above a base not shown in the figure, and these are driven to rotate by a motor not

shown in the figure. Arm (4) that has magnetic head (3) for read/write of information on disks (1) is fixed on actuator (5), and it is arranged facing disks (1). (6) represents a cover that connects to the base, not shown in the figure, to form a sealed structure. (7) represents a spoiler that directs air between disks (1) so as to improve the floating stability and dust purging capability of magnetic head (3).

Figure 4 is a diagram illustrating a conventional spoiler. It is a cross section illustrating the interior of sealed structure (DE).

As shown in the figure, spoiler (7) has a comb shape, with spoiler teeth (13) arranged between disks (1). These act to guide the internal air between said disks (1) to the periphery and make it circulate to filter (8) on the upper/lower sides of the high-air-pressure device in order to remove dust. (9) represents a servo surface for positioning the head. (10) represents a base.

Problems to be solved by the invention

In the conventional magnetic disk device, spoiler (7) becomes a heating source due to the resistance to air flow caused by rotating disks (1), leading to a temperature rise between disks (1). The device is sealed, and flow of air between disks (1) is not completely uniform. Also, air is forced in from outside the device for cooling. As a result, there is temperature difference between disks (1) on the upper/lower sides and disks (1) in the middle. Consequently, thermal mistracking occurs.

In the prior art, there is no technology that can actively correct the temperature difference between said disks (1). All of the methods available at present depend on the air flow in the magnetic disk device, and there is no way to effect active control.

The purpose of this invention is to solve the aforementioned problems of the conventional methods by providing a type of temperature control spoiler that can actively correct temperature differences between disks (1) in order to reduce the thermal mistracking resulting from temperature differences between disks (1).

Means to solve the problems

The aforementioned problem is solved by means of the temperature control spoiler of this invention shown in Figure 1. Temperature control spoiler (7) is arranged between media (1) of a magnetic disk device, which has magnetic disk media (1) holding recorded information and a magnetic head for recording/reproduction of information on/from said media (1) accommodated in a sealed structure (DE);

said temperature control spoiler (7) has shapes with different windages depending on the temperature distribution between media (1) so as to reduce the temperature differences between said media (1).

Functions

In other words, spoiler (7) arranged between disks (1) has shapes with different windages depending on the temperature distribution between disks (1).

For example, as far as the shape of spoiler (7) is concerned, ventilating holes (12) are formed in spoiler teeth (13) in [spaces] ①, ⑧ between disks (1) having a higher temperature with respect to servo surface (9), as shown in Figures 2(a), (b). Consequently, the air resistance is reduced, and it is possible to prevent a rise in temperature in ①, ⑧ between disks (1). Also, spoiler teeth (13') between disks (1) in ②-⑦ have the shapes shown in Figures 2(c), (d). Consequently, the air resistance becomes higher, and the temperature is increased in ②-⑦ between disks (1). Because spoiler teeth (13) have shapes creating different windages, it is possible to have temperature uniformity among disks (1), and thus to reduce the thermal mistracking.

Application examples

Figure 1 is a diagram illustrating an application example of this invention. Also, the same part numbers are adopted throughout all the figures.

Figure 1 is a cross section illustrating the internal structure of DE [disk enclosure] of the magnetic disk device. Plural disks (1) are held on spindle (2) above base (10), and they are driven to rotate by a motor not shown in the figure. A magnetic head, not shown in the figure, for read/write of information on disks (1) is held on an arm fixed on an actuator, and it is arranged facing disks (1). DE represents a sealed structure composed of a cover and a base. (7) represents a spoiler that directs air between disks (1) so as to improve the floating stability and dust purging capability of the magnetic head.

Said spoiler (7) has a comb shape, with spoiler teeth (13) arranged between disks (1). These guide the air between disks (1) to the outer periphery to circulate the air to the inlet of filter (8) arranged at the upper/lower sides of the device providing a higher air pressure in order to remove dust. According to this invention, the shapes of spoiler teeth (13) create different windages corresponding to the temperature distribution between disks (1). More specifically, when the temperature between disks (1) in ①, ⑧ is higher with respect to servo surface (9), the shape of spoiler teeth (13) in ②-⑦ is different from that in ①, ⑧.

For example, as shown in Figures 2(a), (b), ventilating holes (12) are formed in spoiler teeth (13) between ①, ⑧. Consequently, the air resistance is reduced by ventilating holes (12), and it is possible to prevent a rise in temperature. Also, the spoiler teeth in ②-⑦ have the shapes shown in Figures 2(c), (d). Consequently, the air resistance is higher, and the temperature is

increased in ①, ⑧ [sic; ②-⑦] between disks (1). As an example, spoiler teeth (13) have thickness t = 6 mm and length l = 50 mm; ventilating hole (12) is a rectangular hole with a = 5 mm and b = 3 mm. As a result, the temperature differences among disks (1) becomes uniform, and it is possible to reduce the thermal mistracking resulting in the temperature difference among disks (1).

Although ventilating holes (12) have a rectangular shape in the aforementioned application example, this invention is not limited to this shape. Also, by changing the air resistance of ventilating holes (12) formed in spoiler teeth (13) by changing spoiler teeth (13) according to the temperature distribution between disks (1), one can make temperature corrections between disks (1) with high precision.

Effects of the invention

As explained above, according to this invention, by making the shapes of the spoiler between disks have different windages corresponding to the temperature distribution among the disks, it is possible to make high-precision corrections for nonuniform temperature distribution in an easy way. As a result, it is possible to reduce the thermal mistracking.

Brief description of the figures

Figure 1 is a diagram illustrating an application example of this invention.

Figures 2(a)-(d) illustrate the spoiler shapes in this invention.

Figure 3 is a diagram schematically illustrating a magnetic disk device.

Figure 4 is a diagram illustrating a conventional spoiler.

1 Magnetic disk medium (disk)
2 Spindle
7 Spoiler
8 Filter
9 Servo surface
10 Base
12 Ventilating hole
13, 13' Spoiler teeth

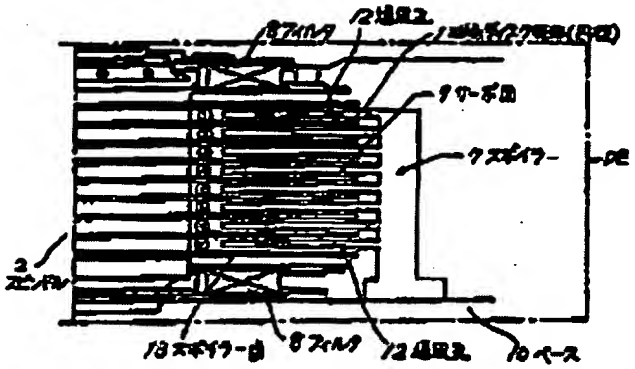

Figure 1. An application example of this invention.

Key: 1 Magnetic disk medium (disk)
2 Spindle
7 Spoiler
8 Filter
9 Servo surface
10 Base
12 Ventilating hole
13 Spoiler teeth

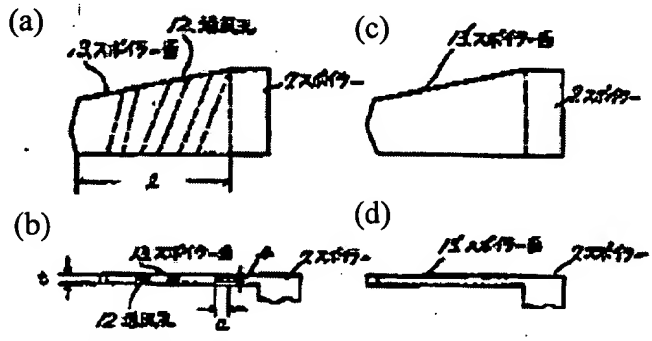

Figure 2. (a), (b), (c), (d) Spoiler shapes in this invention.

Key: 7 Spoiler
12 Ventilating hole
13, 13' Spoiler teeth

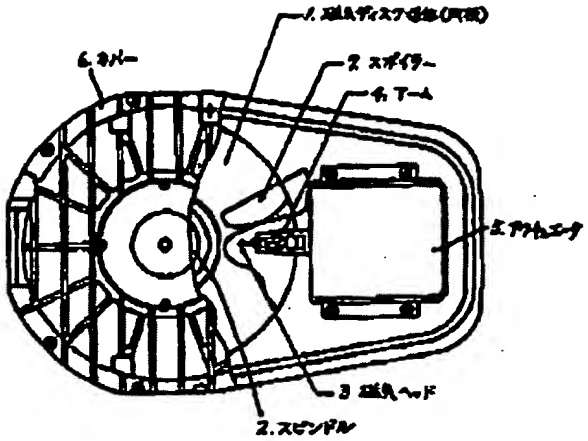

Figure 3. Diagram schematically illustrating a magnetic disk device.

Key: 1 Magnetic disk medium (disk)
2 Spindle
3 Magnetic head
4 Arm
5 Actuator
6 Cover
7 Spoiler

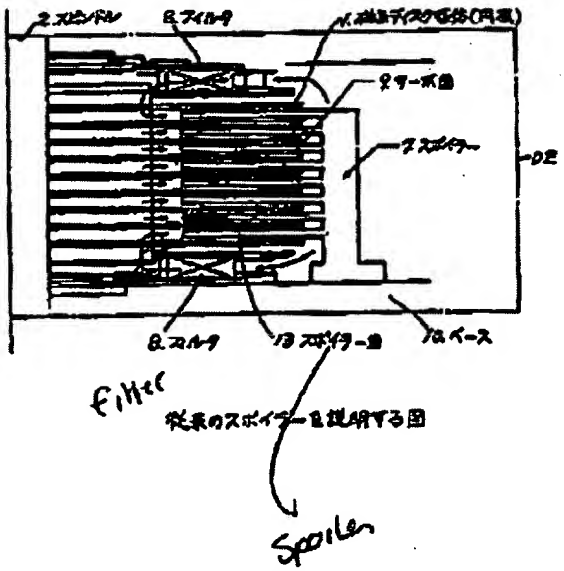

Figure 4. Diagram illustrating a spoiler in the prior art.

Key: 1 Magnetic disk medium (disk)
2 Spindle
7 Spoiler
8 Filter
9 Servo surface
10 Base
13 Spoiler teeth